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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/083,401

02/27/2002

Yoshiharu Maeno

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04/03/2006

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EXAMINER

AHMED, SALMAN

ART UNIT

PAPER NUMBER

2616

DATE MAILED: 04/03/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/083,401

Applicant(s)

MAENO, YOSHIHARU

Examiner

Salman Ahmed

Art Unit

2616

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 3/13/06(Remark).
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-33 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1, 3-12, 14-22, 24-32 is/are rejected.
- 7) ☒ Claim(s) 2, 13, 23 and 33 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 27 February 2002 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Claims 1-33 are pending.

Claims 2, 13, 23 and 33 are objected.

Claims 1, 3-12, 14-22, 24-32 are rejected.

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1, 3, 4-6, 9, 10, 22, 24-27, 30-32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Beshai et al. (US PAT 6570872), hereinafter referred to as Beshai, in view of Sinclair (Minimum cost wavelength-path routing and wavelength allocation using a genetic-algorithm/heuristic hybrid approach Sinclair, M.C.; Communications, IEE Proceedings-Volume 146, Issue 1, Feb. 1999 Page(s):1 – 7).

3. In regards to claims 1, 6, 22 and 32, Beshai teaches a network node for a communications network (column 1 lines 9-10, switched data network) which comprises a plurality of network nodes (column 1 line 4, Data switches) interconnected by communication links (column 2 lines 60-61, direct channel paths and tandem channel paths) wherein said network node is one of plurality of network nodes, comprising: a

Art Unit: 2616

first module (figure 1a element 83), having a plurality of input ports (figure 1a element 97) and a plurality of output ports figure 1a element 96), for handling a group of channels between input ports and output ports as a routing unit; a second module (figure 1a element 82), having an input port (figure 1a element 93) and an output port (figure 1a element 92), for handling a channel between the input port and the output port as routing unit; a module state database for storing module cost data of first and second modules (column 13 lines 12-18, The global controller 162 maintains $2XN$ module-state matrix, one row of the matrix stores each module's available capacity on channels connecting the module to the core) a link state database for storing link cost data of said communication link (column 13 lines 12-18, $2XN$ module-state matrix, and the second row of the matrix stores the available capacity on channels connecting the core to each module) a switching system (figure 1a, element 84 and global controller 162 (FIG. 6)) for determining a route of minimum cost by using module state database and link state database and establishing, according to the determined route, a connection between one of a plurality of incoming communication links and one of the input port of first and second modules and establishing a connection between one of the output ports of first and second modules and one of plurality of outgoing communication links (column 13, lines 19-40, when a new connection request is sent from a module 84, 84a to the global controller 162, the sink module is identified. The corresponding entries in the module-state matrix are examined. If either entry is smaller than the connection capacity requested in the connection request, the connection request is placed in a standby queue (not shown). Otherwise, the connection request is entered in

a connection request queue 280 shown in FIG. 10, and the entries in the 2.X.N module-state matrix are debited accordingly. Each entry in the connection request queue 280 includes three fields: a source module identifier 282, a sink module identifier 283, and a requested connection capacity 284. The standby queue has the same format as the connection request queue. The connection capacity requested is preferably represented as a fraction of a capacity of a channel. A 20-bit representation of the channel capacity, for example, permits an integer representation of each fraction with a relative accuracy within 1 per million. A request entered in the request queue may be accepted if an internal route can be found as described in the following steps: (1) The request queue is sorted in a descending order according to capacity requirement before a matching process begins; (2) An attempt is made to find a direct path from the source module to the sink module for each connection request in the request queue. This involves carrying out a matching process as described above. The matching process is implemented for each entry in the request queue starting with the highest requested connection capacity. A request for a high connection capacity has fewer matching opportunities than a request for a small connection capacity. Thus, the requests for higher connection capacities are preferably processed before the available channel capacity is assigned to requests for low capacity connections. Each time a connection request is successfully assigned, each of the corresponding entries in the channel-vacancy matrices (242, 244) or (262, 264) is decreased by the value of the assigned capacity).

In regards to claims 1, 22 and 32 Beshai does not explicitly teach using cost data of self and other network nodes as well as link cost information to find minimum cost routing. In regards to claims 6 and 27 Beshai does not explicitly teach second module is capable of converting the wavelength of wavelength channel to a different wavelength. In regards to claims 3, 24 and 31 Beshai does not explicitly teach link state database includes a first plurality of link entries for storing status of links to first and second network node and a second plurality of link entries for storing status of forwarding adjacency link between first and second network nodes, said second plurality of link entries containing a total cost of links and modules. In regards to claim 10, Beshai does not explicitly teach physical link and virtual link entries for storing status of concatenated links.

In regards to claims 1, 3, 10, 22, 24, 31 and 32 Sinclair in the same field of endeavor teaches using a cost model to optimize network for minimum cost routing. Sinclair teaches (section 2, page 2-4) to determine the cost of a given network; separate models for both links and nodes are required. For the nodes, a node effective distance was used as a way of representing the cost of nodes in an optical network in equivalent distance terms. It can be regarded as the effective distance added to a path as a result of traversing a node. The network cost is then taken to be the sum of the costs of all the individual links and nodes comprising the network. NOMaD represents networks as objects, coded in C++, composed not only of nodes, links and ordered sequences of paths, but also objects representing the network's adjacency matrix, connection matrix (which records link levels in hierarchical networks) and the traffic requirements. Further,

networks include additional objects to represent the cable, fiber and wavelength-routed structure of a multi-wavelength optical network. In regards to claims 6 and 27 Sinclair teaches (page 4), the wavelength chosen is the one that results in the smallest increase in overall path length, given the constraint that all rerouting must be to lower wavelength numbers than the original wavelength of the path being shifted down.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Beshai's node/system by incorporating the method of doing minimum cost routing calculation as taught by Sinclair. The motivation is that (as suggested by Sinclair, page 1) such approach is not simply to minimize NWR, but rather to obtain a minimum cost allocation. Experimental results from seven fifteen-node test networks, obtained using a tool for optical network optimization, modeling and design (NOMaD), suggest the GA/heuristic hybrid approach provides superior results compared to three recent wavelength-allocation heuristics, except when the network cost depends most heavily on wavelength requirement.

In regards to claims 4 and 25 Beshai teaches (FIG. 2) a schematic diagram of a wavelength-multiplexed switch 100.

In regards to claims 5, 9, 26 and 30 Beshai teaches (FIG. 1a) a schematic diagram of a hybrid switch in accordance with the invention, which includes N electronic modules 84, a channel switch 82 and a dedicated data switch 83, which switches only tandem connections. Each module 84 receives data traffic from subtending traffic sources through incoming feeder links 86 and delivers data traffic destined to subordinate sinks through outgoing feeder links 87. Local subtending data traffic is

switched directly to subordinate sinks through each module 84 as indicated by the dashed line 85. Each module 84 receives W incoming channels 92 from the channel switch 82, and sends W channels 93 to the channel switch 82. Each module 84 also receives B channels 96 from the data switch 83 and sends B channels 97 to the data switch 83.

In regards to claim 22, Beshai teaches a management center (figure 6, a global controller 162) connected to network nodes via control channels (column 9 line 66, channel directed to the global controller 162).

4. Claims 11, 12, 14-17, 20 and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Beshai, in view of Sinclair, in view of Uematsu et al. (US PAT PUB 2001/0019540), hereinafter referred to as Uematsu.

In regards to claims 11 and 12, Beshai, in view of Sinclair teach an optical switching node as described in the rejection of claim 1 above.

In regards to claims 11 and 12 Beshai, in view of Sinclair do not explicitly teach terminating circuitry for transmitting a message to neighboring network nodes for communicating the contents of module state database and receiving a message from said neighboring network nodes for updating module state database according to the received message.

In regards to claims 11 and 12, Uematsu in the same field of endeavor teaches (page 2 section 0026 and 0027) the step of sending the topology data in any direction

Art Unit: 2616

from any node, and circulating the topology data in the ring; and receiving the topology data by the node in a direction opposite to that of the above step and performing topology construction.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Beshai, in view of Sinclair's teaching by incorporating the teachings of storing and providing topology related update data to other nodes as taught by Uematsu. The motivation is that (as suggested by Uematsu, page 2 section 0051) it is possible to set topology data individually for the part performing circulation in one direction and the other part performing circulation in the other direction, and, thereby, to improve the degree of freedom in setting topology data.

In regards to claim 15, Beshai, in view of Sinclair teach (Beshai ,FIG. 2) a schematic diagram of a wavelength-multiplexed switch 100.

In regards to claim 16 and 20, Beshai, in view of Sinclair teach (Beshai ,FIG. 1a) a schematic diagram of a hybrid switch in accordance with the invention, which includes N electronic modules 84, a channel switch 82 and a dedicated data switch 83, which switches only tandem connections. Each module 84 receives data traffic from subtending traffic sources through incoming feeder links 86 and delivers data traffic destined to subordinate sinks through outgoing feeder links 87. Local subtending data traffic is switched directly to subordinate sinks through each module 84 as indicated by the dashed line 85. Each module 84 receives W incoming channels 92 from the channel switch 82, and sends W channels 93 to the channel switch 82. Each module

Art Unit: 2616

84 also receives B channels 96 from the data switch 83 and sends B channels 97 to the data switch 83

In regards to claim 17, Beshai, in view of Sinclair teach (Sinclair, page 4), the wavelength chosen is the one that results in the smallest increase in overall path length, given the constraint that all rerouting must be to lower wavelength numbers than the original wavelength of the path being shifted down.

In regards to claims 14 and 21 Beshai, in view of Sinclair teach using a cost model to optimize network for minimum cost routing. Beshai, in view of Sinclair teach (Sinclair , section 2, page 2-4) to determine the cost of a given network; separate models for both links and nodes are required. For the nodes, a node effective distance was used as a way of representing the cost of nodes in an optical network in equivalent distance terms. It can be regarded as the effective distance added to a path as a result of traversing a node. The network cost is then taken to be the sum of the costs of all the individual links and nodes comprising the network. NOMaD represents networks as objects, coded in C++, composed not only of nodes, links and ordered sequences of paths, but also objects representing the network's adjacency matrix, connection matrix (which records link levels in hierarchical networks) and the traffic requirements. Further, networks include additional objects to represent the cable, fiber and wavelength-routed structure of a multi-wavelength optical network. In regards to claims 6, 27 Beshai, in view of Sinclair teach (Sinclair, page 4), the wavelength chosen is the one that results in the smallest increase in overall path length, given the constraint that all rerouting must

be to lower wavelength numbers than the original wavelength of the path being shifted down.

5. Claims 7, 8, 28 and 29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Beshai, in view of Sinclair, in view Watanabe et al. (US PAT 6701088), hereinafter referred to as Watanabe.

Beshai, in view of Sinclair teach an optical switching node as described in the rejection of claim 1 above.

Beshai, in view of Sinclair do not explicitly teach first module comprises an optical regenerator module for simultaneously performing an optical regeneration process on a plurality of wavelength channels and second module comprises an optical regenerator module for performing an optical regeneration process on a wavelength channel.

Watanabe in the same field of endeavor teaches (column 2 lines 1-21) using optical regenerator in an optical switch during optical switching.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Beshai, in view of Sinclair's method/system by incorporating the usage of optical regenerator in an optical switch during optical switching as taught by Watanabe. Such techniques were well known to one of ordinary skills in the art at the time of the invention. Further motivation is that (as suggested by Watanabe, column 2 lines 1-21) in the WDM communication channel, wavelength-

Art Unit: 2616

multiplexed signals WDMS provided to input optical backbone transmission lines OBB-11 to OBB-14 are demultiplexed for each wavelength in wavelength demultiplexing parts 51-1 to 51-3, then the optical signals of the individual wavelengths are regenerated by optical regenerators 52-1 to 52-16, respectively, then the regenerated optical signals are cross-connected by optical switches 53-1 to 53-4 to predetermined routes and are multiplexed in wavelength multiplexing parts 54-1 to 54-4, from which the wavelength-multiplexed optical signals are provided to output optical backbone transmission lines OBB-21 to OBB-24. The optical regenerators 52-1 to 52-16 each convert the optical path signal of one wavelength to an electrical signal, and applies it to a laser light source, thereby generating an amplified and shaped optical path signal.

6. Claims 18 and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Beshai, in view of Sinclair, in view of Uematsu, in view of Watanabe.

Beshai, in view of Sinclair, in view of Uematsu teach an optical switching node as described in the rejection of claim 1 above.

Beshai, in view of Sinclair, in view of Uematsu do not explicitly teach first module comprises an optical regenerator module for simultaneously performing an optical regeneration process on a plurality of wavelength channels and second module comprises an optical regenerator module for performing an optical regeneration process on a wavelength channel.

Watanabe in the same field of endeavor teaches (column 2 lines 1-21) using optical regenerator in an optical switch during optical switching.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Beshai, in view of Sinclair in view of Uematsu's method/system by incorporating the usage of optical regenerator in an optical switch during optical switching as taught by Watanabe. Such techniques were well known to one of ordinary skills in the art at the time of the invention. Further motivation is that (as suggested by Watanabe, column 2 lines 1-21) in the WDM communication channel, wavelength-multiplexed signals WDMS provided to input optical backbone transmission lines OBB-11 to OBB-14 are demultiplexed for each wavelength in wavelength demultiplexing parts 51-1 to 51-3, then the optical signals of the individual wavelengths are regenerated by optical regenerators 52-1 to 52-16, respectively, then the regenerated optical signals are cross-connected by optical switches 53-1 to 53-4 to predetermined routes and are multiplexed in wavelength multiplexing parts 54-1 to 54-4, from which the wavelength-multiplexed optical signals are provided to output optical backbone transmission lines OBB-21 to OBB-24. The optical regenerators 52-1 to 52-16 each convert the optical path signal of one wavelength to an electrical signal, and applies it to a laser light source, thereby generating an amplified and shaped optical path signal.

Allowable Subject Matter

7. Claims 2, 13, 23 and 33 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Response to Arguments

8. Applicant's arguments, see pages 3-5 of the Remarks section, filed 3/13/2006, with respect to the rejection of claims 1, 3-12, 14-22, 24-32 under 35 U.S.C. 103(a) have been fully considered but they are not persuasive. Applicant argues that to establish a prima facie case of obviousness, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify a reference or combine references to arrive at the claimed subject matter. The prior art references must also teach or suggest all the limitations of the claim in question. See, M.P.E.P. § 706.02(j). However, Examiner respectfully disagrees. The test for obviousness is not whether the features of a secondary reference may be bodily incorporated into the structure of the primary reference; nor is it that the claimed invention must be expressly suggested in any one or all of the references. Rather, the test is what the combined teachings of the references would have suggested to those of ordinary skill in the art at the time the invention was made. See *In re Keller* 642 F.2d 413, 208 USPQ 871 (CCPA 1981).

Applicant further argues that among the limitations of Applicant's independent claims not present in the cited references is a module state database for storing module cost data of first and second modules and module cost data of other network nodes; (and) a link state database for storing link cost data of communication links. However, Examiner respectfully disagrees. The present claim language is broad and in view of the broadest reasonable interpretation of this language, cited reference does teach a

module state database modules (column 13 lines 12-18, The global controller 162) for storing module cost data (column 13 lines 12-18, available capacity on channels) of first and second modules (column 13 lines 12-18, The global controller 162 maintains 2XN module-state matrix, one row of the matrix stores each module's available capacity on channels connecting the module to the core) a link state database modules (column 13 lines 12-18, The global controller 162) for storing link cost data (column 13 lines 12-18, available capacity on channels connecting the core to each module) of communication link (column 13 lines 12-18, 2XN module-state matrix, and the second row of the matrix stores the available capacity on channels connecting the core to each module).

Applicant further argues Sinclair fails to cure the deficiency in Beshai as discussed above. However, Examiner respectfully disagrees for the reasons described above.

Conclusion

1. Applicant's remarks necessitated the rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any

Art Unit: 2616

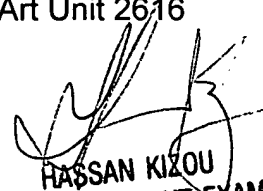
extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Salman Ahmed whose telephone number is (571)272-8307. The examiner can normally be reached on 8:30 am - 5:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Hassan Kizou can be reached on (571) 272-3088. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

SA
03/29/06

Art Unit 2616

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